

WHAT IS CLAIMED IS:

1. A fusing system of an image forming apparatus comprising:

a fusing unit having a fusing roller and a heater for heating the fusing roller; and

5 a fusing temperature control unit having a paper feeding part having at least one of a pickup roller for picking up a sheet of printing paper and a paper jam sensor ; a sensor part for sensing a surface temperature Temp of the fusing roller; and a controller for determining whether it is time to drive the heater for heating the fusing roller of the fusing unit when a sheet of printing paper is fed by the paper feeding part, and driving the heater when it is time to start  
10 a heater driving-start timing.

2. The fusing system of claim 1, wherein the controller determines whether it is a heater driving-start timing, on the basis of one of a first time t1 and a third time t3, and a second time t2, when a sheet of printing paper is picked up by the pickup roller, and when a leading end  
15 of the sheet of printing paper picked up by the pickup roller operates the paper jam sensor, the first time t1 being a time from when the sheet of printing paper is picked up to a when the sheet of printing paper arrives at the fusing roller, the second time t2 being a time required until a heat generated from the heater reaches a surface of the fusing roller, and the third time t3 being a time from when the sheet of printing paper operates the paper jam sensor to when the sheet of  
20 printing paper arrives at the fusing roller, and when determined that it is the heater driving-start timing, calculates a heater driving time th according to at least one factor selected from a target surface temperature Tt for the fusing roller previously determined at a temperature required in fusing, a surface temperature Temp of the fusing roller detected by the sensor part, and a changeable slope a of the surface temperature Temp of the fusing roller and then drives the  
25 heater for the calculated heater driving time th.

3. The fusing system of claim 2, wherein the heater driving-start timing is determined

by subtraction of the second time t2 from the one of the first time t1 and the third time t3.

4. The fusing system of claim 2, wherein the heater driving time th is calculated using the following mathematical formula.

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$$th = \alpha \times (Tt - Temp) - \beta \times a + \gamma,$$
  
              where  $\alpha$  is a proportional constant,  
               $\beta$  is a differential coefficient, and  
               $\gamma$  is a constant.

10           5. The fusing system of claim 2, wherein the determined heater driving-start timing is delayed for a predetermined time based on a subtraction of the second time t2 from at least one of the first time t1 and the third time t3.

15           6. A temperature control method of a fusing system for use in an image forming apparatus comprising the steps of :  
              determining whether it is a heater driving-start time to drive a heater for heating a fusing roller of a fusing unit when a sheet of printing paper is fed by a paper feeding part; and  
              driving the heater when it is determined that it is the heater driving-start timing.

20           7. The temperature control method of claim 6, wherein the step of determining whether it is the heater driving-start time comprises,  
              determining whether the sheet of printing paper is fed by the paper feeding part; and  
              determining whether it is the heater driving-start timing to drive the heater when it is determined that the sheet of printing paper is fed by the paper feeding part.

25           8. The temperature control method of claim 7, wherein the operation of

determining whether the sheet of printing paper is fed by the paper feeding part comprises one of determining whether a pickup roller for picking up the sheet of printing paper of the paper feeding part is driven, and determining whether a paper jam sensor is operated, the paper jam sensor being disposed at a lower part in a paper feed direction of the pickup roller.

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9. The temperature control method of claim 8, wherein the operation of determining whether to initiate the heater driving-start timing comprises,

determining one of a first time  $t_1$  and a third time  $t_3$ , and a second time  $t_2$ , the first time  $t_1$  being a time from when the sheet of printing paper is picked up by the pickup roller to when the sheet of printing paper arrives at the fusing roller, the second time  $t_2$  being a time required until a heat generated from the heater reaches a surface of the fusing roller, and the third time  $t_3$  being a time from when the sheet of printing paper operates the paper jam sensor to when the sheet of printing paper arrives at the fusing roller; and

determining the heater driving-start timing by determining whether a difference in time  $t$  between the one of the first time  $t_1$  and the third time  $t_3$  and the second time  $t_2$  elapses.

10. The temperature control method of claim 9, wherein the operation of determining the heater driving-start timing comprises delaying for a predetermined time after the difference in time  $t$  between one of the first time  $t_1$  and the third time  $t_3$  and the second time  $t_2$  has elapsed.

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11. The temperature control method of claim 9, further comprising the steps of:

determining whether the second time  $t_2$  is larger than the one of the first time  $t_1$  and the third time  $t_3$  after the operation of determining one of the first time  $t_1$  and the third time  $t_3$ , and the second time  $t_2$ ; and

directly moving to the step of driving the heater when it is determined that the second time  $t_2$  is larger than one of the first time  $t_1$  and the third time  $t_3$ .

12. The temperature control method of claim 9, further comprising the steps of:  
determining whether the surface temperature Temp of the fusing roller is  
above the target surface temperature Tt after the operation of determining the heater driving-  
start timing by determining whether the difference time t elapses; and  
5 stopping the driving of the heater when it is determined that the surface  
temperature Temp of the fusing roller is above the target surface temperature Tt.

13. The temperature control method of claim 9, further comprising a step of  
10 controlling to alternately turn on and off the heater when a printing speed exceeds a  
predetermined speed after the operation of determining the heater driving-start timing by  
determining whether the difference time t elapses.

14. The temperature control method of claim 13, when the printing speed is  
15 determined by one selected from an information of printing speed previously input in the image  
forming apparatus, a driving period of the pickup roller of the paper feeding part, and a feeding  
speed of the sheet of printing paper conveyed by a feed roller of the paper feeding part.

15. The temperature control method of claim 6, wherein the step of driving the heater  
20 comprises:

calculating a heater driving time th according to at least one factor selected from a  
target surface temperature Tt for the fusing roller previously determined at a temperature  
required in fusing, a surface temperature Temp of the fusing roller detected by a sensor part, and  
a changeable slope a of the surface temperature Temp of the fusing roller, when it is determined  
25 that it is the heater driving-start timing; and  
driving the heater for the calculated heater driving time th.

16. The temperature control method of claim 15, wherein the heater driving-start time  $t_h$  is calculated by the following mathematical formula

$$t_h = \alpha \times (T_t - \text{Temp}) - \beta \times a + \gamma,$$

5 where  $\alpha$  is a proportional constant,

$\beta$  is a differential coefficient, and

$\gamma$  is a constant.

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